Проведённые эксперименты доказывают, что морфология подложки влияет на рост УНТ. Полученные после синтеза изображения демонстрируют различную структуру УНТ на поверхности тэнита, камасита, плессита. Средний диаметр полученных структур – 25 нм, среднее аспектное отношение – 25. Дальнейшие эксперименты направлены на выявление зависимости параметров УНТ от степени травления подложки и сравнение диаметров исходных структурных составляющих метеорита с диаметрами УНТ.

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CENTERS OF CRYSTALLIZATION IN ANTIMONY THIN FILMS STUDIED BY TRANSNISSION ELECTRON MICROSCOPY

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We performed TEM studies of 7 crystallization centers using specially evaporated Sb thin films in finite areas. Strong internal lattice bending is revealed by use of the bend contour method.

Sb thin films are known for their so-called “explosive” crystallization from the amorphous state [1]. A new application of antimony has been recently discovered: single-element phase change memory devices of extremely small volumes [2].

We evaporate our antimony thin film samples in vacuum through special masks with finite apertures placed on a mica substrate with carbon sublayer. It helped to find crystallization centers in further transmission electron microscopy (TEM) studies.

The microstructure of seven antimony thin areas was investigated by TEM, using extinction bend contour method [3] for crystal lattice orientation analyses using electron microscope JEM-2100 at accelerating voltages 80 and 200 Kv.

Extinction bend contours are diffraction reflections from certain atomic planes forming Bragg angle with the electron beam. They look like dark lines in TEM micrographs, Fig. 1. Their star-like morphology allows us to recognize crystallization centers. The prevailed orientations in their area, [001] and [122], were identified by means of the analyses of bend contour patterns combined with selected area electron diffraction.

Several centers of crystallization were studied with typical examples shown on Fig. 1. We can notice that crystal grains, which are away from the crystallization centers, are thin and elongated. Their boundaries are clearly visible. Crystal grains in the vicinity of centers are preferably less elongated larger single crystals, more round and contain more complex alternating zone axis patterns. There grain boundaries are often vague, and it is difficult to identify the shape of crystal grains accurately.

The thickness of the film and the degree of internal bending of the crystal lattice were estimated using measurements of inter-contour distances at the bright field and dark field images. The film thickness is in the range from 7 to 11 nm, and the internal crystal lattice bending is in the range from 70 to 80 degrees per micrometer. The latter value is great enough, and, therefore, we suppose this strong lattice bending corresponds to phenomenon of "transrotation" [4] in our initially amorphous films.

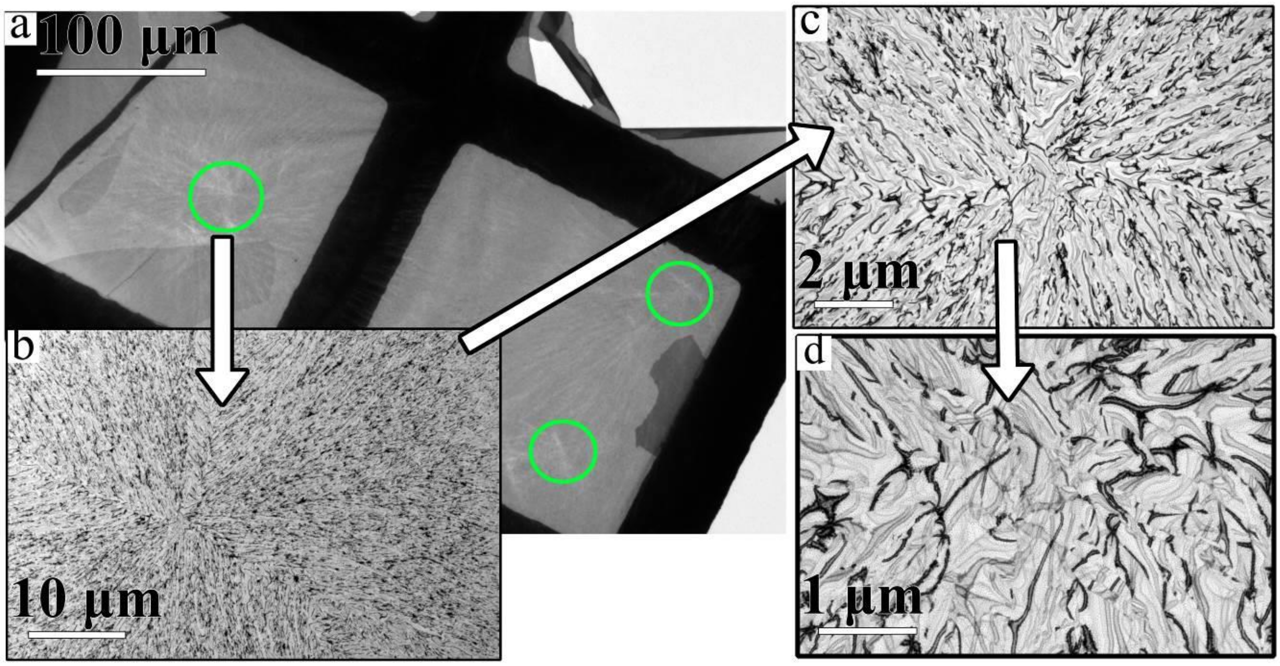

Fig. 1. TEM micrographs of the antimony thin film. Crystallization centers are shown by green circles (a); the micrographs for one of the crystallization centers are also shown at different magnifications (b-d).

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